

# SUPPLEMENT.

# The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

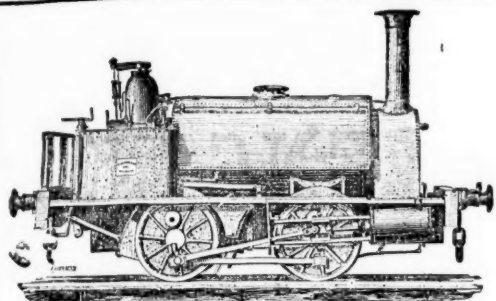
FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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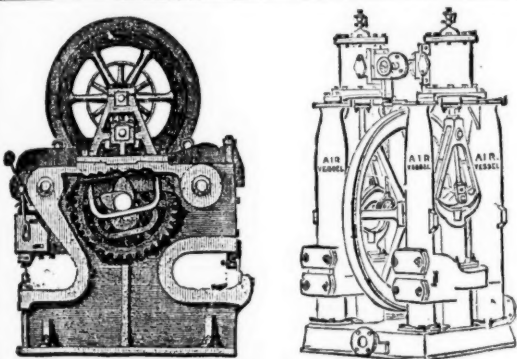
No. 2020.—VOL. XLIV.

LONDON, SATURDAY, MAY 9, 1874.

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FOR CONVEYING  
CHARGE IN  
SAFETY FUSE,  
FIRE TO THE  
BLASTING ROCKS, &c.

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"INTERNATIONAL EXHIBITION" of 1853, in London; at the "IMPERIAL  
EXHIBITION," held in Paris, in 1855; at the "INTERNATIONAL EXHIBI-  
TION," in Dublin, 1865; at the "UNIVERSAL EXPOSITION," in Paris, 1867;  
at the "GREAT INDUSTRIAL EXHIBITION," at Altona, in 1869; and at the  
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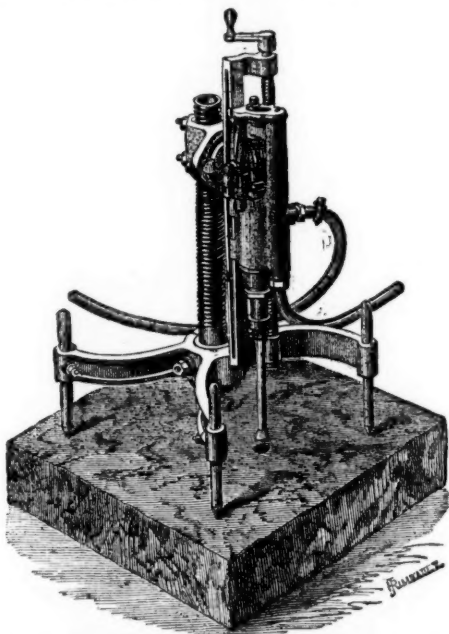


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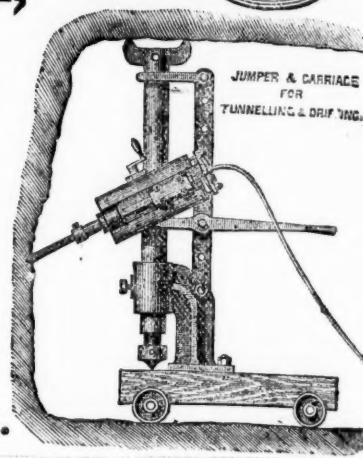
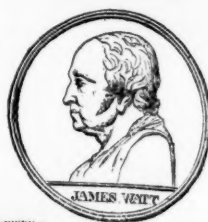
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ANDRE'S PATENT HYDRAULIC MINING PUMP,  
AND SUPERIOR

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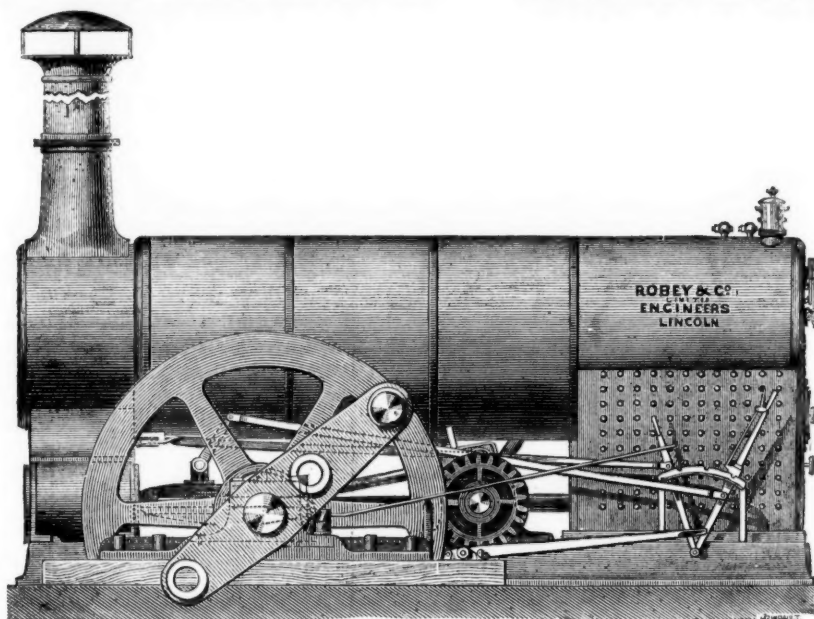
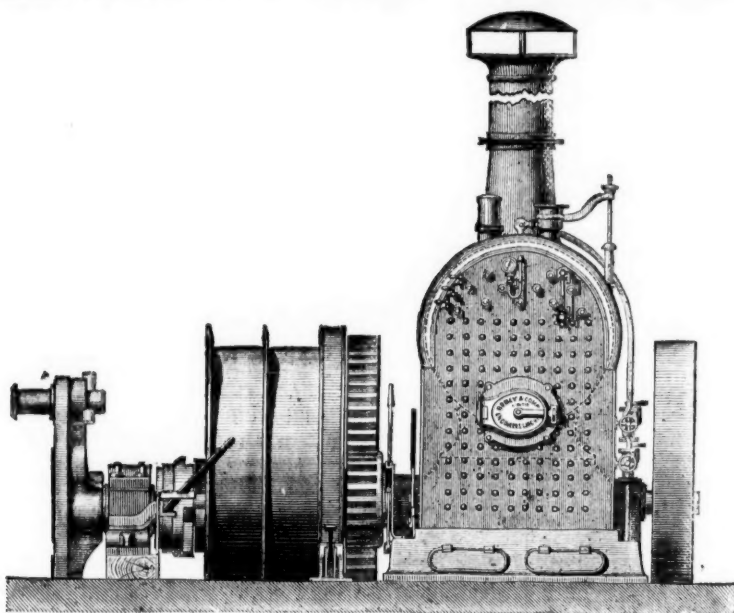
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THE PATENT

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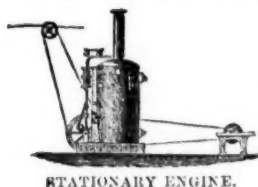
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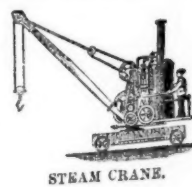
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(ESTABLISHED 1764.)

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PERFECTLY AIR-TIGHT AND ANTI-ROT PROOF.

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COPPER RAMMERS, SCRAPERS, &c.

GEORGE J. MAY,

THE GREEN, NEATH, GLAMORGANSHIRE.



## Original Correspondence.

## ASHANTEE GOLD.

Sir,—No analysis of Ashantee gold has, so far as I can learn, been yet published. The richness of its surface colour, due in part to red oxide of iron, is rather deceptive, for I find that the average alloy of the native Ashantee nuggets is nearly 10 parts in 100. French gold of the same standard, but our English sovereign contains but 8.33 per cent. of alloy, the alloy in both these cases being copper. In the Ashantee gold copper is virtually absent, its place being taken by silver. Some clean fragments, cut from different nuggets, had the specific gravity 17.55, and gave the following results on analysis:—

Gold	90.055
Copper	A faint trace.
Iron	A trace.
Silver	9.950=99.945

Royal Agricultural College, Cirencester, May 4.

A. H. CHURCH,  
Professor of Chemistry.

## AUSTRALIAN TIN.

Sir,—I wrote you last month, promising to send you the quantities of tin sent from the Australian mines month by month, and enclosing the quantities forwarded during the last six months of 1873, and January, 1874. (These returns were published in the Supplement to the Mining Journal of April 11.) I now enclose the quantities forwarded during February, and append a memorandum of the quantity of tin and tin ore exported from Sydney during the last six months of 1873, and January and February of this year; this will show the proportions of smelted tin, and of ore that is exported, and that rather more than half is smelted here now.

This telegram shows that the Brisbane merchants have reduced the price of tin ore at the mines to 4½d. per lb., and many of the claim holders are off to the new gold diggings in Northern Queensland in consequence.

I also enclose an account of tin smelting works, lately erected in one of our suburbs, that may not be without interest; and also the last half-yearly report of the celebrated Peak Downs Copper Mining Company. About 18 months ago this company paid to its shareholders a dividend of 100 per cent. (100,000*l.*) for the six months ending June 31, 1872, they have now, as the report shows, sunk from a dividend-paying to a prospecting mine.

C. E.

Sydney, March 12.

## QUANTITIES OF TIN ORE FORWARDED FROM THE TIN MINES DURING THE MONTH OF FEBRUARY 1874.

	Tons c. qr. lbs.	Tons c. qr. lbs.
Feb. 1 to 12 ..... Via Warwick	215 12 3	20
13 ..... Ditto	118 4 0	12
14 ..... Ditto	86 9 2	28= 420 6 3 2
February 4 ..... Via Murrumbidgee	25 12 1	0
11 ..... Ditto	18 12 2	7
18 ..... Ditto	29 10 3	8
25 ..... Ditto	21 11 1	20= 95 7 0 7
February 4 ..... Via Grafton	35 5 0	0
9 ..... Ditto	1 17 0	0
9 ..... Ditto	18 5 0	0
16 ..... Ditto	34 13 0	0
21 ..... Ditto	36 19 1	4
23 ..... Ditto	32 9 1	4
24 ..... Ditto	6 13 0	0= 166 1 2 8

Total for the month.....Tons 631 15 1 17  
Memorandum of tin and tin ore exported from Sydney in the last six months of 1873:—  
In 13 ships 10,803 ..... 24,212 at 70 per cent.=847 tons 8 cwt.  
Jan. 1874 ..... 11 ships 9,939 ..... 10,659 at 70 per cent.=7461 3 cwt.  
Feb. .... 4 ships 4,968 ..... 5,375 at 70 per cent.=3762 5 cwt.

## PYRMONT TIN SMELTING AND REFINING WORKS.

These works, recently erected by Messrs. Mort and party, cover an area of some 6000*ft.*, 4000 of which are occupied by the smelting and refining departments, and the remainder by the dressing departments. In these are to be found all the appliances necessary for the metallurgy of tin ores; hence the ores of any class and character can be readily treated in these works. The first thing that catches the eye on entering the works is the smelting and refining room which occupies the whole of the southern boundary of the area. It contains nine furnaces, of which one is an oxydising furnace, four are deoxydising, and four are refining furnaces. The deoxydising furnaces are built in stacks of two, the brickwork being bonded together and armoured by ½ in. iron plates kept compact by powerful bolts. The principle of construction and armoring is the same as that adopted in the works of the Marquis of Westminster, Mr. Beaumont's, and other large metallurgical establishments in the North of England. Imported fire-bricks are used for the bed of the furnace, but such is the penetrative power of the tin when in a state of fusion, that not only does it work its way into the joints between the bricks, but actually penetrates the bricks themselves, and some hundredweights of metal have been found, on recently taking down the furnaces, in the brickwork of the furnaces, and of that of the underground flues which communicate with the main stack, into which it had permeated in a manner scarcely credible. Each deoxydising furnace is equal to the reducing of 1 ton of fair class ore in eight hours.

The flues from the various furnaces run under the floor of the smelting room to the chimney or stack, which is 80 ft. high, with an internal area of 3000 inches. These flues are carried up the stack independently for some 20 ft., at which height they all open out into the one flue. The oxydising furnace has not yet been used, but it will be found very valuable at no distant date for the treatment of sulphurets from our quartz mines; as by its means gold can be chemically obtained from the different species of pyrites so common in most of our richer mines.

The dressing department is provided with a small stamping battery; with a crushing mill, consisting of two iron rollers, which can be so set as to reduce the material to any required fineness; and with classifying and separating appliances, somewhat on the principle of the flour-dressing cylinder. All these are worked by means of a horizontal engine of 8-horse power. The whole of these appliances, as well as the iron work and armour for the furnaces, have been manufactured by Messrs. Dry Dock and Engineering Company, from a drawing made by Mr. Carpenter, manager of the works. In designing these works, Mr. Carpenter has introduced all the metallurgical improvements which have of late years been made in the large establishments of England, having during a recent visit to the Parent Company been able to obtain a considerable amount of valuable experience. Some idea of the success which has attended these works from the commencement may be gathered from the fact that, since the first essay of the company, in November last, between 300 and 400 tons of tin ore has been reduced at this establishment, although there has been a considerable drawback in the circumstance that the persons who had to be employed on the works were altogether inexperienced in work. So much was this the case that many of the persons employed as smelters had never before so much as seen a tin smelting establishment.

Mr. Carpenter also informed us that he experienced another difficulty at the outset, from the circumstance that the major portion of the colonial tin ores requires a different treatment to that which is bestowed upon the tin ores of Cornwall; whilst a good deal of trouble was met with at first owing to the difficulty in getting the proper reducing agents. In spite of all these drawbacks, the average loss of tin produced in these works has been about 3 per cent., whilst the quality of tin produced is somewhat exceeds 99 per cent. When we come to consider that the block tin produced by the Cornish smelting works only averages in purity 98½ per cent., it seems strange that Australian tin should realise so low a figure in the English market. This Cornish block tin realises in the English market 5*l.* per ton over and above the price paid for Straits tin. Now, the last returns from England show that the price paid for Australian tin was some 4*l.* per ton less than that paid for the Straits tin, so that we have a difference of 9*l.* per ton as between the block and the Australian tin, and yet the latter is actually ½ per cent. richer than the former. This is a serious matter to companies who have invested large sums in developing tin land, and requires to be well looked into in order that it may be remedied. As we are concerned, and without going too closely into the matter, we should say that this low price is to be attributed to one or the other of the following causes:—

1. Either the adulteration of the metal, or its imperfect reduction. In this way tin has been given to the Australian tin, and it can only be by removing all such doubts in future that our tin will be able to secure its intrinsic value.

The company we are now alluding to are doing a good work in this way, and we have no doubt but that before long their brand will secure as high a price as any other in the English market. The tin deposits obtained from the diluvial soil of this country, when reduced in a skilful manner, will produce the finest tin—in every way equal to that produced in any other country. In proof of this it need only be stated that the average produce of the Cornish ores is 65 per cent., and the Australian ores average 70 to 90, the latter being refined. The produce of these works, ranges from 70 to 90 per cent., and the quality of its tin, as ascertained during us in the face, is certainly seems hard that our tin should be placed so low in the list of quotations.

In connection with the works there is a well-fitted laboratory, with furnaces of different sizes for the conduct of assays. By means of these assays the various principles of chemical research, instead of being left to mere blind chance. In this laboratory the value of the ore is at once ascertained by assay, so that any loss is at once discovered; whilst the component parts of the ore being noted, it can be treated with the least possible loss on proper scientific principles.

PEAK DOWNS COPPER MINING COMPANY.—The directors, in submitting to the shareholders their report of the operations of the company for the past half-year, say:—The smelting works and all the company's plant and machinery are in efficient working order. Arrangements have been made with some of the copper companies in the district to smelt their ore. In August, Capt. Dennis appointed mining agent, and took charge of the mine in November. Capt. Holman recommends that a deep shaft be sunk at a short distance south-east of the old engine-shaft, to intersect the lode at 70 fms., which will cost from 6000*l.* to 8000*l.*, and many claims have been abandoned. There is a general depression, and the Palmer.

take two years to accomplish. Before undertaking a work of this magnitude, the directors are desirous of ascertaining what reasonable hopes may be entertained of obtaining from the present explorations a sufficient quantity of payable ores to defray its cost, and at the same time cover current expenses. The balance-sheet shows at debit of profit and loss account on Dec. 31, 31,244*l.* 12*s.* 7*d.*, against which there is a reserve of 15,608*l.*, and a surplus is anticipated from the shipments of copper in suspense. A portion of the produce of the mine (118 tons of copper) has been sold in Sydney.

## MINING IN QUEENSLAND.

Sir,—The London news telegraphed on Saturday last, advising us of sales of tin at 110*l.*, has caused considerable uneasiness and depression here; the result has been a drop of 70 per cent. ore to 4*d.* per lb. on the field, and at that price only the very richest ground will pay or continue to be worked. The total tin ore shipped from the Warwick Railway Station for the month of January was 331 tons 4 cwt. 2 qrs. 9 lbs., a considerable falling off on the average monthly shipments during 1874. The heavy wet during the latter part of December and all January has, no doubt, been the chief cause of this, but the number of men arriving here, en route to the Palmer, will tend to reduce the yield much more for some months than the wet weather has done. The late fall in price will have a still more damaging effect on yield, and, if we are to take present appearances as a criterion, there will not be 100 Europeans on the tin fields in a month from this date—publicans, storekeepers, captains, and men are all on the "rush." Our local tin smelting company has now four furnaces at full work, and they are, I understand, commencing to build two more at once. They are now turning out 52 tons tin slabs per week, and have a large stock on hand waiting turn. They are alone in the field yet, although there is stream tin enough to keep six or eight more furnaces going. The smelting company paid 27 per cent. dividend. As to our future supply, if your smelting ring would raise the price of tin to 140*l.*, and send us out 2000 or 3000 men who would be satisfied with 3*l.* a-week wages, I might estimate it, but as the matter now stands, I defy anyone to say what the yield for 1874 may be; my impression is that it will not reach half the yield of 1873, but such an opinion is of no value, as there is no data to go by. The shipments of tin from Sydney during 1873 I have not as yet been able to procure, as they are not yet made up by the Customs authorities. While on the subject of Queensland tin, might I ask what becomes of the gold and silver that it generally contains? Some samples contain large quantities of gold. The gold I have sometimes seen coated with black oxide of tin or copper, and which requires an experienced eye to detect, while in other parcels it is quite observable in its natural colour. Can any of your readers say what becomes of it? or who gets the advantage of it? We here do not! In copper there is little doing, only two companies may be said to be at work, the Peak Downs and the Mount Perry, but the copper miners are also on the "rush," and I shall not be astonished at any time to hear that the furnaces are drawn for want of hands.

Antimony is now being successfully worked in the Wide Bay district by a few local capitalists, and as the mines are near port, and the lodes very wide and rich, the venture is expected to pay well, even at present high wages. Quicksilver lodes in the same district are now being tested and proved by some London capitalists, amongst which the name of Rothschild is mentioned.

In gold all eyes are now turned to the Palmer; every scrap of news is eagerly read and discussed. The latest, just brought down by the Commissioner of Police, is that the wet season had just set in, and that there were some 2000 men on the field, 1000 on the road from Cookstown (cut off by the swollen rivers), and about 2000 at Cookstown, which latter number was daily increasing, and where provisions were plentiful and cheap, excepting fresh meat, which was not to be had. The rainy season is expected to be over by the third week in March, and the country fit to travel on in about a month after. The road is now shortened to 108 miles, so that although all supplies will have to be packed on horses for some months, yet the distance is so short that there will be no scarcity at the diggings. At every town along the coast there are crowds of diggers waiting for ships to take them and their horses on to the Endeavour. There are over 500 here to-day ready to start if shipping could be procured. I hear that there is also a large number of men prepared to start from Victoria, about the middle of April, by which time, I have no doubt, Cookstown will have a very considerable population. The richness of the country in gold is now beyond dispute, and I am informed, on the best authority, that it is the most extensive reefing district yet discovered in Australia.

Brisbane, Feb. 27.

RESIDENT.

## STRATIFIED LIMESTONE FORMATIONS.

Sir,—I have been induced to speak of these again in consequence of a letter of Prof. Silliman to Prof. Clayton, published in the *Utah Mining Gazette* of March 21, wherein Prof. Silliman says, "Collect all the facts you can respecting fissure veins in limestone, as the existing literature of these is very scarce." You no doubt recollect the first letter which you were kind enough to publish on the above, as far back as 1861, and later on a second one, in March, 1872, describing the fissure veins of Chancarrillo, in Chile, and their wonderful riches. These ores were forwarded to England, and purchased by the Swansea smelters, who can testify to the truth of my assertions that these formations produce the greatest riches, and the richest ores. The third letter you published in the *Journal* in August, 1872, was under the heading of "Eccentricities of Stratified Limestone Formations," embracing a description of several mines in Utah.

As far back as 1847, while a student at Freiberg, I gave to Prof. Breithaupt the first specimen of horn silver, iodide, and bromide from the limestone formation of Chile, which he described (from my notes) in his "Paragenesis of Minerals." In 1852 I forwarded to Prof. Cotta several petrified shells, found by me in a fissure vein at 100 ft. from surface, also a description of the largest ammonites ever found, weighing from 50 to 100 lbs., also in the limestones of Chile.

I have contributed my mite to this subject for years past. I am glad to see Prof. Clayton giving great attention to the subject in his admirable letters in the *Utah Mining Gazette*, accompanied with magnificent diagrams. I will now give a few more illustrations of the riches of fissure bed or strata veins in stratified limestones.

One of the most remarkable of these fissure veins was that of Cabeza de Vaca, in Chile, discovered in 1849, and subsequently inspected by me in 1852. This vein was only 4 in. wide, perpendicular, and the formation nearly horizontal. The ore was massive horn silver, 2½ in. wide. At a depth of 80 ft. the ore changed into massive pure silver, 2½ to 3 in. in thickness, and continued so to a depth of 400 ft. The ores averaged from \$15,000 to \$20,000 per ton, and this mine produced \$3,000,000 in about one year. The length of this ore body was never more than 90 ft.

In the province of Coquimbo, Chile, I inspected several fissure veins. These contain about 64 per cent. of quicksilver, and about \$3000 per ton in silver, called arquerite, and described in Dana's "Mineralogy," p. 287.

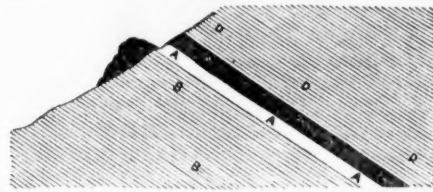
In the last century the greatest blocks of native silver from fissure veins were shipped from the limestones of Guantajaya, in Peru; these were so great that they had to be rolled along the ground for several miles for shipment to Spain. One of these is spoken of as having weighed 2700 lbs.; pieces of these can now be seen in the Mineralogical Museum of Madrid.

The celebrated mines of Puno, in Peru, consisted also of fissure veins, averaging 3 to 4 in. of pure solid silver, and produced millions of dollars. Those of the district of El Doctor, in Mexico, have been described by Dr. Ure in his "Dictionary of Arts and Sciences," and stated to have produced some \$30,000,000. In Utah we have also some fissure veins in limestone, and many bed or strata veins.

The peculiarities of these fissures, or strata veins, in limestone are the sudden contractions to a mere thread, and then again expansions forming immense bodies of ore. It is these contractions that cause the panics, and subsequent expansions, that bring on again the extraordinary excitement. The celebrated Mono Mine, of Dry Canyon, Utah, will now cause one of those excitement, but this time it will be with Californians, who are preparing for race. This mine has sold several cart-loads (10 tons) of ores that have produced from \$4000 to \$7000 per ton, and several hundred tons have been sold that will average \$1000 per ton. The vein is a bed

vein, between limestone and shales. This mine is owned by only four persons, and has produced in a year over \$600,000.

CROSS SECTION OF MONO MINE, AS GIVEN BY PROF. CLAYTON



A. A. Strata Vein. B. B. Limestones. C. C. Shales. D. D. Limestones.

The mine, although producing fabulously rich ore, has not even the merit of being a fissure vein, and resembles in some points the Emma, Camp Floyd, Flagstaff, and many other strata veins. The depth of this mine is 600 feet, and has been a great success, in consequence of being managed, personally by the owners, with intelligence and economy. It is now reported that this mine has 2 ft. of the richest horn silver ever discovered in the United States, the specimens reminding me of our massive horn silver found in Chile.

Finally, I will also bring an extraordinary fact again to notice—that we have never had a silver mine in Chile that was not in limestone formation, that the matrix in these veins is lime-spar, without a trace of silica.

In Mexico the Real del Monte Mines, although in porphyry, carry great quantities of lime-spar as a matrix. Sometimes we have heavy spar in the Chilean veins, but this is exceptional. I contend that silver ores in limestone formations, or when lime-spar is met with as a matrix in the veins (although in Plutonic rock), produce the richest silver ores. The Silver Islet Mine, on Lake Superior, is one of the many fissures which carry lime-spar as a matrix.

Utah, April 14.

HENRY SEWELL.

P.S.—As regards Mr. Ennor, all I can say is that it is folly for him to be wise, where his self-sufficient ignorance is his bliss.

## CAPE COPPER MINING COMPANY.

Sir,—Since writing the letter which appeared in last Saturday's *Journal* the colonial officer's reports have been published; and as at first sight it would appear there is a discrepancy between the statement in my letter as to the reserves of copper ore in the Ookiep Mine and that given in Capt. Tonkin's report, I think it right to explain that that very cautious and able mining engineer only estimates 6000 tons in the 68 fm. level, being for the ore discovered in the slight portion of the level then driven (1000 fms.), and who states, "It should be fully understood that in estimating the reserves of ore ground discovered in back of the 68 fm. level I do not take into consideration the probable quantity of copper ore that may be found between the level and the one immediately above, but only so far as we have driven and actually discovered the ore. There is no doubt in my mind that we shall have a large area of productive ground at the 68 fm. level, but the estimates of that ground will be continued in the next annual report after the levels are extended, winzes sunk, and the ground fully explored." And, as he remarks in another part of his report, "The ore ground extending so far in this direction (east from No. 9 winze) shows that we have a larger area of productive ground at the 58 fm. level than at any point above." I think we may safely conclude the ore ground extends in the 68 fm. level for at least the same extent as it does in the as yet partially developed 58 fm. level above, which would give at the lowest calculation 15,000 tons more of ore than that taken into account by Capt. Tonkin, and which would bring the reserves up to some 50,000 tons of copper ore; and that is irrespective of the immense mass of ore supposed to exist between the 68 and proposed 80 fm. levels, to which latter level the main shaft is now descending, and which when developed next year will probably expose to view tens of thousands of tons of ore, the effect of which on the future financial position of the company it would not be difficult to anticipate.

I am glad to see Capt. Tonkin in his report of Karolus Berg states, "This level (10) has been carried forward in what appears to be the main branch of a regular lode, which runs east and west and dips north at an angle of 63°;" and as it would appear the present appearance of that mine is more favourable than Ookiep when it was first worked, I am in hopes we shall soon be informed we have a third producing copper mine rivaling Ookiep, from which it is distant five miles only.

There are many matters referred to in the colonial officer's reports of an interesting nature; for instance, Angola goats and ostriches (with which I understand it is the directors' intention to stock their immense territory), which I have not time to enter into, but to which I would recommend the attention of your readers, as well as the plans and sections lately received from the colony, all of which can be seen at the company's office, and where, as before stated, every reliable information can be obtained as to the present state of affairs and future prospects of the company.

The great point to be borne in mind with respect to the future of the Cape Copper Mining Company is the small amount of its dividend-paying capital (140,000*l.*), and its exemption from preference and debenture stocks (the third, and last, instalment of its debenture debt of 21,000*l.*, borrowed for the construction of the railway, is to be paid off out of profits derived from the railway itself on July 1 next), which affords a dividend, even at the present low value of copper, of 20*s.* per share per quarter, or 4*l.* per annum. In 1872-73, the value of copper being higher than at present, 25*s.* a quarter was paid, making the dividend for two years at 8*l.* 15*s.* a share, or in all 175,000*l.*, a sum exceeding by 35,000*l.* the capital of the company.—May 6.

ANOTHER INVESTOR.

## ORE DRESSING MACHINERY.

Sir,—From time to time the loss of ore from the Great Laxey floors has been made a bone of contention at the meetings of the company, and being myself largely interested in mining, I made a point of visiting some of the mines in North Wales and also the North of England, for the sole purpose of satisfying myself as to the best mode of treating silver-lead and other ores, and, without egotism, I may say that I came home much wiser on that point than I left it.

The great secret of dressing ores, especially those rich in silver, lies in the classification of the various grains of stuff after they are crushed, and if that all-important point is left unattended to the proper dressing and saving of ore can never be attained. Supposing now, for instance, that grains of pure ore are mixed up with grains of loadstone, which may be four times the size of the grains of ore, those grains of waste-stuff are sure to carry with them the small grains of ore, which, consequently, entails a great loss of ore, and especially so in the Great Laxey, where some hundreds of tons of stuff are treated daily; their loss in that respect must be enormously great, and from the constant complaints from some of the shareholders of ore going down to the sea, I can very well understand that it is the want of proper machinery to classify their stuff that they stand so much in need of, and for the benefit of the Great Laxey shareholders, whose board of directors are seemingly so very wishful to bring about such results as are always gratifying to one and all concerned, I would call their attention to the machines lately being erected at the Stoncroft Mines, near Hexham, and at the Rhoswyddol Mines, Montgomeryshire, and I have no hesitation in stating that it is at those two mines that I found the most perfect and most economical mode of treating ore-stuff that I had the pleasure of witnessing in all the mines I visited—and they were not a few,—and without saying anything disparagingly of other systems, in all of which there is something to be learned, I saw nothing in their entirety to compare to these. They are not heavy and ponderous machines, requiring an unusual amount of power to drive; and another important item in connection with the system is that a sufficient quantity of them to treat scores of tons every day can be placed in so small an area of building that it is surprising to think that so large a quantity of stuff is being daily treated, and that in such a systematic manner. It is quite a comfort to all employed therein, and not



like many floors I have seen, through which I could not go without having my boots buried in mud and slime. For one that may have seen them cannot do less than admit them to be the very things that are wanted in these days of the scarcity of manual labour, and when much work at little cost is studied; and I am sure that were some of the directors of the Great Laxey or any other mine to go to either of the mines I mentioned, that they would be shown over the floors by the officials in charge with the same amount of courtesy as I received from them. And, Sir, I may conclude by congratulating those who have been instrumental in bringing these machines to such a state of perfection, and also in congratulating those who have already had the forethought of having them erected at their mines.

M. P.

## THE EXPLOSIVES COMMITTEE.

SIR.—The proceedings of the Committee on Explosives, referred to in last week's Journal, require serious consideration. I believe it is the intention of the Government to bring in a Bill to regulate the manufacture, carriage, storage, and sale of all explosive materials. The regulations under which the manufacture will be conducted will interest but few of your readers, but the regulations affecting the carriage, storage, and sale are of primary importance to every miner in the kingdom.

So far as I can gather from the proceedings of last Tuesday, one provision of any new Bill will be to render it necessary for any vendor of gunpowder to take out a retail license; and if the conditions under which such licenses are granted are not too stringent I think a great improvement in the law will be effected. I do, however, hope that in the interest of working miners a provision will be made that any dealer licensed to retail gunpowder will be also allowed to retail dynamite or guncotton. I am a small user of these materials, and am much troubled from the difficulties in procuring the former of them. I have neither the means to purchase nor conveniences to store 1 ton or even  $\frac{1}{2}$  ton of dynamite, and am often at great loss obliged to use powder in very hard and wet rock, where blasting powder is useless, because I cannot buy a few pounds of dynamite. Why should not retail dealers, who have a store properly set apart, be allowed to store a moderate quantity of dynamite as well as gunpowder? This material is particularly valuable in removing boulder stones and stumps of trees in land-clearing operations, but the restrictions upon its sale effectually prevent its use in England for this important agricultural purpose. In making restrictions the framers of the law, whilst particularly keeping in view the safety of the public, should not altogether forget their convenience, and no trade should be hampered by restrictions which are so exaggerated that they are daily and systematically violated.

ANOTHER MINER.

## EXPLOSIVES.

SIR.—The present law relating to explosives is bad in two particulars.—1st, From inadequate restrictions; and 2nd, from excessive restrictions. The inadequate restrictions are—that the manufacture, storage, transport, &c., of large groups of explosives are either not regulated at all or are so inadequately regulated as to be practically unprovided for. The manufacture of guncotton, sawdust-powder, and all nitro and chlorate explosives (other than those which contain nitroglycerine) is only so far restricted that the manufacture may or may not be licensed, but their storage, transport, and importation are under no regulations whatever. The power of the licensing authorities in imposing conditions is unduly limited by the Act, so that there can be seldom any proper conditions or precautions with regard to the tools or machinery, the construction or isolation of buildings, the clothing of the workpeople, the due separation of the operations, or the adoption of proper rules in the factories, and many safeguards are thus often and recklessly disregarded. The provisions as to the carriage of gunpowder and explosives are often, too, quite inadequate. Gunpowder may be taken in large quantities through the streets of populous towns and cities without any supervision beyond that given by a common carrier, and it may be so conveyed in any ordinary cab or vehicle, and it may be loaded or unloaded in public places without any proper or particular precautions being taken. Gunpowder may be stored in any town, or in any house, or, indeed, in every house in a town, if the person who wishes to keep it states himself to be a dealer, in which case he may keep 200 lbs. of loose gunpowder anywhere in his house, even should he elect to store it in a cupboard next to the kitchen fire; or any person may keep any unlimited quantity of guncotton anywhere if he be not the manufacturer. The present Act does not prevent the licensee from storing unlimited quantities of powder, or from extending these magazines or buildings of limited capacity to a size which may cause considerable danger to the public, nor does it place any limitation of the distance of gunpowder factories from dwelling-houses; and river and sea walls, canal and river banks, railways, highways, factories, schools, hospitals, cathedrals, and public buildings are not protected in any case.

These inadequate restrictions unquestionably require alteration, and in many cases it is imperatively necessary that they are defined by law and the factories placed under the legal control of an efficient inspector. One can understand how the present uncontrolled state of the powder trade has gradually grown up until it has become a source of danger, but that no restrictions should apply to guncotton, which has been proved and is well known to be dangerous in use and storage, whilst they are so severe upon other nitro-explosives, must astonish every person acquainted with the fact, unless it may be Professor Abel, who could doubtless give some explanations of the mystery. Some of the "excessive restrictions" are, that in the case of miners no magazine for the use of a mine may be within half-a-mile of the church or one mile of the limits of any borough or market town, or within two miles of a palace (though any quantity of guncotton may be kept inside a borough, or next door to a church or palace), and the distances laid down are such that if the law were to be enforced a very large proportion of the mine magazines throughout the kingdom would have to be closed. Again, the conditions required to be fulfilled by firework makers in regard to the isolation of their buildings from one another and from dwellings are unnecessarily restrictive, and tend to discourage the smaller makers and to promote the illicit manufacture in dwelling houses and unsuitable places. No provision is made for the temporary storing of gunpowder for use in the making of docks, railways, &c., and thus the material has to be kept illegally, and, consequently, in secret and without precaution. Whilst large quantities of powder may be kept loose by any person, powder may not be kept in cartridges (a form in which the risk is very far less, and, indeed, in some cases inappreciable) in larger quantity than 5 lbs. in an unlicensed place.

No person may sell a single squib or a half-penny cracker without a license, and the filling of cartridges, which is done by nearly every gun-maker and half the sportsmen in the kingdom, is forbidden to be carried on except by license, or within 100 yards of a dwelling-house, whilst everybody knows that, as a rule, sportsmen, miners, colliers, and quarrymen do prepare their cartridges in their dwelling-houses. But it is when we come to the law relating to nitroglycerine, preparations of which dynamite is the only one manufactured in Great Britain, that the severity, and even absurdity, of the restrictions chiefly strikes us. By the Nitroglycerine Act it is enacted that any person who imports, exports, manufactures, sells, carries, or otherwise disposes of, or has in his possession, any nitroglycerine, or any substance having nitroglycerine in any form as one of its component parts without a general or special license issued by a Secretary of State is guilty of a misdemeanour, and is liable to be imprisoned with or without hard labour for any period not exceeding one year, or to pay a penalty of 500*l.*, so that while any person may keep 50 lbs. of gunpowder for his own use, or 200 lbs. if he deals in it, or 2 tons for mining purposes under certain conditions, or an indefinite quantity of guncotton unconditionally, no one may have a single ounce of a nitroglycerine preparation, such as dynamite, without a licence from the Secretary of State. And while the maker or storer of guncotton may, and frequently does, obtain an unconditional and unlimited licence, the whole trade in nitro-glycerine preparations is absolutely at the mercy of the Secretary of State in regard to the conditions under which the manufacture, storage, transport, &c., shall be carried on. And whilst the

penalties for offences against the Gunpowder Acts are in many cases ridiculously inadequate, and in some cases summary penalties are not provided at all, the penalty for offences of whatever description against the Nitroglycerine Act is 500*l.*, or a year's imprisonment with hard labour, or 100*l.* for a breach of the conditions of the license. Obviously if such penalties were attempted to be put in practical operation our prison accommodation would be found much too limited.

These restrictions are not only almost prohibitory to the manufacture, but they give rise to an impression that an explosive which requires to be so exceptionally treated must be very alarmingly and exceptionally dangerous, and possibly the feeling so engendered (notwithstanding the accumulated proofs of safety) may have induced the shipping companies and some of the railways to decline giving even ordinary facilities for the free distribution of dynamite, whereas I believe it is a fact that no accident has ever arisen with that material, either in handling, storage, or during transport.

I think, Sir, I have shown you that legislation is now absolutely necessary, so that, where necessary, precautions may be legalised, and, where possible, undue restrictions may be modified, and I shall hope in a future letter to point out in what way some of these things may be accomplished with due regard to the safety of the public and the convenience and necessities of the mining industry.

Q. E. D.

## KALOSIC GAS.

SIR.—I thought my letter in reply to Mr. Bartlett was sufficiently clear to carry conviction to most people; and I still think that it did so to the majority of your readers who are interested in such topics. But as he has published another letter upon the subject, which I find, upon careful perusal, distorts my meaning, and charges me in the most unfounded, and withal in the most invidious, manner with gross professional ignorance, I feel bound to notice it; and here once for all, let me observe that I have already given in my previous notices the true facts and figures in connection with my kalosic gas; and if Mr. Bartlett thinks he has studied the subject longer than I have, experimented upon it more extensively, and is better qualified to give a true exposition of the case than I am, I must leave him to the enjoyment of his opinion. But when he goes further than this, and seeks to saddle me with conclusions which I never formed, and never expressed, with words which I never uttered, and with absurd chemical convictions which I never entertained, it is going a little too far; it is carrying the supposed argument beyond the limits of truth. In proof of this, let me call attention to the following quotation from Mr. Bartlett's letter. I will not garble it, as he has done mine, I will give it entire. He says—

"Here let me point out that neither common air nor kalosic gas can be termed definite chemical compounds. Nitrogen does not necessarily combine, in the proportion of its combining equivalent with oxygen to form air, nor will it enter into definite chemical combinations, with carbonic oxide to form heating gas. This is Mr. Baggs's first great mistake; he appears to have thought that mixtures of such gases would chemically combine, and in their proportional equivalents only, whereas they mix in any proportions, and do not, chemically speaking, combine at all. So much for Mr. Baggs's misapplication of the principles of the atomic theory and volumetric chemistry."

Now, this statement is wholly and entirely untrue from beginning to end. I never in one single instance said or thought that the oxygen and nitrogen of the air existed as a chemical compound. I never said, or thought, or dreamt that nitrogen entered into chemical combination with carbonic oxide to form heating gas, and Mr. Bartlett well knew that I never said so, or meant to convey any such meaning, or else he measured the amount and quality of my chemical knowledge by the contracted limits of his own general experience. For the last 40 years I have closely studied the principles and practice of chemistry and the applied sciences, and am I now to be told that I do not even understand the mere alphabet of atmospheric chemistry? Am I to be saddled, without let, hindrance, or warrant, with the false and exploded theories of a former age, simply because it suits the line of Mr. Bartlett's argument to place me in a false light?

Now to the proof direct whether Mr. Bartlett's statement is true or false. I have been off and on a contributor to the pages of the *Mining Journal* over a period of some 30 years, and I have written upon a great variety of subjects. If in the whole course of my various papers, chemical and otherwise, including those upon kalosic gas, Mr. Bartlett can find one single instance—only one single instance—where I state that atmospheric air is a chemical compound of nitrogen and oxygen, or that kalosic gas is a chemical compound of nitrogen and carbonic oxide, I will at once give way, but if he cannot, then his statement and his assertions must stand for what they are, and for what they are worth, and if his premises are untrue, what becomes of his consequences? "This is Mr. Baggs's first great mistake," and "So much for Mr. Baggs's misapplication of the principles of the atomic theory and volumetric chemistry." Where is the mistake, and where is the misapplication, except in Mr. Bartlett's fallacious assumptions, and, therefore, most illogical inferences. It seems to be the same with words as with principles, for Mr. Bartlett makes me say that he is writing in the interest of some frightened gas company. Now, I never used the word frightened as applied to gas companies, or, indeed, in any other way. I do not believe in the present state of affairs that they are frightened of anything but legislative interference, and a lower dividend than 10 per cent. I hope the next time Mr. Bartlett writes he will argue upon facts, and not convenient suppositions and surpluses of his own manufacture.

ISHAM BAGGS.

## COAL.

SIR.—If any peculiar idiosyncrasy pertains to me, I flatter myself it can only be that of an unusual degree of amiability, or at all events a willingness to comply with the expressed wishes of others, and a desire to be obliging; but when your correspondent at Eastbourne, in your impression of last week, appeals to me, and asks me to "explain" how it could happen that he should observe the same coals ("Derby Brights" and "Clay Cross") advertised for sale in London at the price of 27*s.* and 30*s.* per ton respectively, and on the same day advertised for sale at Eastbourne, including the cost of the further carriage thither, at 22*s.* and 24*s.* per ton respectively, I begin to feel that he has presumed more than is reasonable, even on such a disposition as mine, and that he has gone "a little way beyond the mark."

I see it stated by the leading counsel in a recent trial of some notoriety, who it is said did not display in exuberance that quality of mind which I persuade myself distinguishes me, that in the course of the somewhat protracted proceedings in which he was engaged his client, with a long grave face, that arrested the attention of the judges and jury, frequently put queries to him, and that one of these read thus—"How many cows' tails will it take to reach from this to the moon?" Now, I have no idea of the reply that was given to the questioner, but I am inclined to think that his interrogatory and that of your Eastbourne correspondent belong to the same category, and that I cannot do better than refer him to the learned Doctor, who it appears is accustomed to intricate problems, for an answer. The worst result that can ensue from my so doing would seem to be that your Eastbourne correspondent will first have to provide the usual *honorarium*, but if so difficult and mysterious a matter can be easily cleared up by such simple means, I cannot suppose (if he obtains the information) that he will deem such a manifestation of public spirit on his part (for doubtless if he should get it he will give us all the benefit of it) otherwise than abundantly recompensed. I am sure he will not do so, if the quality and price of coal are as perplexing to him as they have long been to me.

Having now, as I hope, put your Eastbourne correspondent in the right track to obtain the information he desires, perhaps you will permit me to diverge for a moment into another aspect presented by the coal question, which was not only perplexing but leading directly off the scent, for I am apt to warm upon it, and get talkative I fear. I noticed that when the public were groaning, as it were, under "tap prices" both masters and merchants allowed it to be understood that the infliction was wholly to be attributed to the action of the miners; until even our children for a time laid aside their ditty of "This is the dog that worried the cat that killed the rat that ate the malt that lay in the house that Jack built" (which we know is placing cause and effect in natural sequence), and were to be heard piping the strain "The colliers raised their wages, the masters raised their prices, the merchants increased their

charges, and now Daddie can't pay for coals to boil the potatoes." I say it appears to me that this was not only bad logic, but by no means fair to the poor fellows who, I often lament to see by your columns (alas! how frequently and unnecessarily) are blown up by the half-hundred or more at a time. I think it is admitted now that the true way of putting the case is that a demand sprung up for coal, and that the rise in wages followed, but did not precede, the rise in prices. However, Mr. Thomas Carlyle has proved to be right once more—"A lie cannot live for ever, it must die;" and in reliance on that axiom I shall expect to see the evil practice of offering to sell "Wallsends," the "celebrated Wallsends" (as I have reminded you, all long since exhausted), from collieries in all parts of the country, at all rates of prices, die out too. You will gather, I dare say, from what I have written that if I had my way I would hasten its dissolution. I would enact a law that should compel every colliery from which coals are to be sold to the public to be publicly registered under a distinct name, and therewith an analysis of its coal by a responsible public officer—say, its component parts, its steam, gas, coke, and other producing powers, ashes, &c.; and I would prohibit the selling of its coal under any other name than its own by a very heavy penalty, to be increased in a geometrical ratio for every proved repeated breach of that provision. Why, Sir, the man who sells "14 lbs. at a time" of bad coal, charging for it the price of good, is doing the same sort of thing as the nefarious milkman who sells the poor unsuspecting widow watered milk, thereby causing her little ones, even if the water be not taken from a contaminated source, to pine and die from want of nourishment.

But I have said that these holocausts of useful lives (and when did more estimable men die than some of those who led their fellows in prayer and praise in the Hartley Colliery, as noted down in that "pocketbook") are unnecessary and preventable. So they are! In a colliery that has the requisite pits sunk, and is well ventilated and properly worked and supervised, a calamitous destruction of that most precious of all the Creator's gifts—human life—need but very seldom occur. It is the same as regards our sailors. As that noble minded man, Mr. Plimsoll, has truly observed, "A ship that is properly built, manned, and commanded has comparatively but little to fear from the ocean," at all events in European latitudes. And yet what do we not see? Much the same is it with our railways and the traffic in our streets. Just let us think of a railway sacrificing the life of a servant a-day in professedly Christian England in the 19th century, a fact asserted by Mr. Bass of one of them, and not refuted. Think, again, of some 300 human beings killed in the streets of this metropolis in 1873. Does anyone suppose that a train cannot run at a reasonable speed from town to country, or that a loaded van, with a pair of horses, cannot be driven through the City at a suitable pace, without there being an almost appreciable degree of risk of killing a fellow-creature? If they do, common sense has forsaken them. Why is it, whence is it, what is it all for? It is all to be traced to the selfishness, the callousness, may I not say the wickedness, that exercises so potent a sway—our insatiable greed to make money. It is still true, I fear, that—

"Man's inhumanity to man  
Makes countless numbers mourn."

And, then, above and beyond all is the reflection painful that of the victims of violence, as of all others, it is written—"As the tree falleth so it shall lie;" although we would not seek to follow, even in thought, those who are so often cut off so suddenly, beyond the confines of time.

PICK.

## ARBITRATION.

SIR.—I have read with admiration in the *Mining Journal* of last week the address of Sir George Elliot to the colliery proprietors and their workmen in the county of Durham, recommending to the most serious attention and consideration of both the parties the advisability of endeavouring to get their differences arranged by arbitration. Surely advice to that effect, coming from a counsellor of such large experience and reputation as Sir George Elliot, will not be unheeded; and, in giving so sensible, important, and timely a communication the wide publicity of your columns, and so bringing it under the notice of employers and employed wherever disputes of the kind exist or are likely to occur, I believe you will have done them a signal service indeed if they are wise to profit by its wisdom.

In a similar strain, I see, writes Mr. Henry Taylor, the general secretary of the National Agricultural Labourers' Union. He observes, "What can be more reasonable than that proper boards of appeal and arbitration should be formed, where reason and equity might be appealed to, and thus avoid such calamities as are now raging to the injury of all. This done, a great unseemly would be spread over the apparently dark problems of labour questions, excesses would always be avoided, and harmony might soon prevail." In short, I think nothing could be more obvious than that a recognition of the efficiency of arbitration as a mode of preventing or adjusting disagreements, and a willingness to have recourse to it for the purpose, would be more fraught with benefit to masters and men than any other action that could be taken at the present time, although I may expect to see it in the early future that co-operation will come into play and the husbandman have a share of the harvest, as has not hitherto been the case.

With reference to the question of the miners' wages, it seems to me that it is to be regretted that in the matter of a reduction of wages such terms as 15, 23*½*, 35, 50, and 75 per cent. should be employed. Why not call such reduction so many shillings or pence a-day, or so many pence per ton of coal or iron raised? I am inclined to think that these involved and large-looking figures do mislead to think that these involved and large-looking figures do mislead. It will, no doubt, be said that the men can make the necessary calculations, and readily see their effect, and that those who may not be able to do so are soon informed; perhaps so, but do they not make an impression on their minds of an unfavourable nature, which, while the infliction of it could just as well be avoided, is probably never wholly removed so soon as it should be. The public, I believe, are generally quite unable to understand or appreciate these percentages, and that, again, seems very undesirable; they are apt to conclude that if wages are sufficient after such reductions they were unduly high before they were made, which may be altogether erroneous—at all events I, for one, do not understand them. In order to comprehend what a reduction of 23*½* or 35 per cent. really means, one must know from what the deduction is to be made, and that I apprehend is a very variable quantity.

HOMO.

May 5.

## CORUNDUM—No. II.

SIR.—In the Journal of April 25 I gave a short account of the corundum-bearing serpentine reefs of the Southern Alleghenies. I propose now to describe the manner of occurrence of the mineral in these formations.

Sometimes, though very rarely, the corundum crystals (especially the rubies) are found embedded in the massive crysolite itself. The usual matrix, however, is some rock, forming irregular veins or pockets in the main reef. Conceivably a dish of curdled milk, slightly shaken, and then frozen solid. The veins and pockets of whey permeating the mass of curd would then form a striking counterpart to those of chlorite and other corundiferous matrices in the serpentine. These matrices are all richer in alumina than the surrounding rock, some of them containing as much as 50 per cent. of that element. They may be divided into four principal groups—1st, chlorite (varieties chloinochlorite and Jeffersite); 2nd, Indianite (or white felspar); 3rd, Margarite and diaspore (usually enclosed in uranite (resembling bronze); 4th, black tourmaline or schorl. In this latter case the corundum is usually of a dirty-white colour, and poorly crystallised.

Once, also, I found a vein of kyanite, with blue asbestos, containing pink corundum. Occasionally altered spinel (brown octahedra and massive), zircon, chromite, titanite, and magnetite are found embedded with the other minerals. Chalcedony is always present in these formations, but rarely or never in actual contact with the corundum. It has evidently been formed by percolation, and its appearance is, therefore, no indication of the absence or presence of that mineral.

The occurrence of quartz, however, as might naturally be expected, is a sure sign of the absence of corundum in quantity in the vicinity. There are also a great number of smaller indications impossible briefly to describe, which after a year's experience



abled me to tell almost at a glance whether a serpentine reef were likely to contain corundum or not. One thing might be mentioned: the minerals found with it in situ in North Carolina and Georgia are the same as those we read of as found in transitu with the ruby and sapphire (corundum) of Ceylon and India. I have little doubt, therefore, that anyone with similar experience to that gained by myself in America would have small difficulty in discovering the original formations from which the sapphire placers of India primarily sprang. If they ever are found, and their mineral wealth be anything like in the same proportion to that of their placers that the richness of the American veins bear to their utterly valueless debris, the actual lodes of the East must be rich beyond the wildest dreams of the Arabian Nights.

W. PHILLIPS THOMPSON,  
Consulting Engineer.  
Patent Office, 6, Lord-street, Liverpool, May 7.

#### GOLD MINING IN NORTH WALES.

SIR.—Having read and heard a good deal of the mines in North Wales, and having seen some of them, I beg to offer a few remarks, which may be of use to some of your readers, as to the present and future of gold mining in Wales. It is well known by all gold miners that by driving or sinking, so as to get down to where the different strata and leaders concentrate, and form one strong vein, it proves to be rich. As proof of such, take the Californian mines, the Confluence, Eureka (Amador County), Sierra Buttes, and others in different parts of the world. Few countries have such advantages as Wales, having railroads, good county roads, and abundance of water to work machinery. The mines generally are on the side of the hills, and near the top. I would recommend driving of deep levels, to draw off the water and intersect the different lodes, so as to have good stopping ground. Also to have a really good practical mining captain, to devote his whole time to the mine, and to watch the different formations gone through, and fully competent to set to the miners contract work—if working on quartz so much per ton, if driving, to be careful not to take away more ground than is really required per fathom. I propose to have the mill as near the mine as possible, to save expense in manual labour, and to erect temporary machinery, to prove the different ores to be treated. After a fair trial to erect the machinery required, and if possible to have water-power to drive all machinery. I would recommend the Californian patent feeders.—*Dolgelly, May 5.*

#### MINERS' PAY—THE THIRTEEN-MONTHS SYSTEM.

SIR.—I did not intend to trouble you with any remarks of mine upon this vexed question, but, as the difficulties besetting the present modes of payment appear to be no nearer a satisfactory solution than at the beginning, disinterested opinions, therefore, need not be taken amiss. If both parties whose interests are affected by recent changes studiously avoid issue on the salient points in dispute, it is difficult to see how a remedy can be provided, or, indeed, a compromise effected. If the working miners have a substantial grievance in respect of the five-weeks month, by all means let it be enquired into and redressed. That they have a grievance cannot, I think, be denied, and one which might be fairly met and satisfactorily removed without having recourse to the substitution of an equally offensive measure. I do not think that anyone believes that the miners' objection is levelled against the five-weeks month in the abstract, but against the compulsion of labouring an entire week without any remuneration. The five-weeks month was instituted to suit sundry conveniences, equally accommodating to the workpeople as to their employers, one of which—and the principal—was the pay-day might be always on the same day of the week, and as near the end as possible. If the monthly system is to be kept up in connection with mining—and it should be, as such a system is in perfect agreement with the general working of its complicated parts—it must be admitted that there are but 12 months in a year. The creation, therefore, of a thirteenth month is as arbitrary and unjust as any attempt to compel men to perform labour during that period without paying them for doing it.

To arbitrarily insist that men's earnings, under whatever circumstances, shall not be commensurate with the length of time over which it extends is an offensive, tyrannical act, and one at which one's every sense of justice and love of right takes exception. On the other hand, the men should not persist in demanding—in opposition to the wishes and interests of their employers—that there shall be 13 instead of 12 months in every year, for no other purpose than that of obtaining an additional remuneration for their labour, when it must be admitted that that object could be accomplished in another way, not only to the satisfaction but in the interest of both parties. The disarranging tendency of this clumsy innovation, more than the pecuniary difference in its practical working, will tend to keep alive a strong prejudice against it, and one which reason on its side will be powerless to dispel. It is the more to be regretted that this very inconvenient change had not its origin with the men themselves, but with those who should have known better than to have proposed it. It is surprising that a county meeting in Cornwall in the mining interest should have adopted it. I am apprehensive it will be fruitful of serious injury to mining if a satisfactory compromise is not effected. It would have been much better, and only just, if the originators of this scheme had decided on affording men a fair chance of earning five weeks' wages for five weeks' work. They might have concluded that the state of the labour market and that of mining merited a specific weekly rate of earnings by the men, and on that assumption have proceeded in their estimates for impending contracts, letting it be fairly understood that the average rate of earnings should, so far as prices were concerned, be one-fifth more, or 20 per cent., for the five-weeks month more than for the four. If that had been done there would not, in my opinion, have been the least controversy concerning the five-weeks month; and the men would not only have been equally well pleased, but mining generally would have been correspondingly benefited by the change. I am unequivocally assured in my own mind that such would have been the case. A fair price for the work, according to an understood scale of computation, would inevitably tend to promote industry and increase the efficiency of labour. I cannot see how any one of reflective habits can otherwise conclude than that the course as at present pursued—contracts to the contrary notwithstanding—is pertinaciously tied down to a dead average monthly level. The men betray by their entire deportment, words as well as actions, that though nominally on contract they are in reality monthly men, and their earnings as much determined beforehand as if they were admittedly so. The value of labour is different at different times in the same market, occasioned by a number of facts and considerations which of themselves are legitimately operative independently of any extraneous influences, which when brought to bear with ulterior designs balefully affects the harmony of its working and vitiates the results. Both capital and labour have obligations, which, whether rendered or not, mutually affect each other, especially in speculative pursuits, of which mining is notably an instance. In this pursuit a proper adjustment of their relative obligations is most essential. The tortuous nature of mining, the obscurity of its subterranean passages, and, to all but the experienced operator—and comparatively so to him—the obscurity of the objects of its pursuit, make it absolutely necessary in order to secure its full success, or even an average degree thereof, that the full measure of manual labour should be rendered in exchange for the stipulated money equivalent thereof. To devise means to this end, and at the same time to accord ample justice to the workmen, is one of the chief duties of mine agents. The interests of labour and capital are, in their proper relation, unequivocally identical. Fluctuations in their relative value are usually occasioned by alternations of increase and diminution in the respective sides, which, according to the nature of things, must be productive of effects differently affecting opposite parties.

It surely cannot be necessary in the interests of either that incessant antagonism should be kept up between labour and capital. Mutual considerations should be entertained and mutual concessions made, according to some recognised determinate standard of reference. And if differences arise in respect of it, recourse should be had to arbitration, that grievances might be accorded redress at the bar of justice and right reason. Whenever there is issue between

two parties, extreme measures resorted to by one side are almost certain to be followed by similar extremes on the other, and hence injustice begets injustice, and wrong-doing be progressively perpetuated. In this way the injustice attaching to the five-weeks month, instead of being rooted out and destroyed by means which would have given offence to no one, as it might have been, it is simply sought to be removed to the other side, where it is likely to generate as much mischief to mining as it has hitherto done to the miner.—*Llanrwst, May 6.*

ROBT. KNAPP.

#### MINERS' PAY—THE THIRTEEN-MONTHS SYSTEM.

SIR.—The writer does not feel disposed to deal in personalities, but simply tells "Unity" that he (the writer) has read the *Mining Journal* carefully, especially on this subject, and still admits his inability to perceive any of these so-called arguments, and if "Unity" has such a store of them it is not his duty, as an advocate of the twelve pays, to bring these "irrefutable" arguments forward, knowing that one argument is worth a thousand baseless assertions?

To "Readers,"—"A drowning man catches at a straw." "Readers" have searched the *Mining Journal* for a letter entirely apart from the one written to them, and have criticised it and attempted to hold up the writer to ridicule, whose letter to them "Readers" were perfectly welcome to criticise, and if such an act is not characterised by meanness and injustice the writer still disputes the honour of being No. 1 as Lamponner.

I ask "Unity" and "Readers" how often are colliers paid? How often are tradesmen of every description paid? How often have they heard complaints from Dolcoath, Cook's Kitchen, Carn Brea, Tincroft, &c., about the difficulty in balancing the thirteenth month? Where is the five-weeks month, notwithstanding your strenuous and persistent advocacy of such a system? Observation warrants me to make this assertion, that it is a thing of the past, nowhere does it exist, so you are at perfect liberty to "whine and bark," as "The moon shines bright as ever."

We have won the victory, the decisive blow has been struck.

*Camborne, May 5.*

TROON INSTITUTE.

#### THE DEATH OF THE GREAT WHEEL FOR UNITED MINES.

#### IN THE PARISH OF BREAGE—AND HOW TO RESTORE THEM TO LIFE AGAIN.

SIR.—The letter on the above subject, signed "A Lover of Justice," is the first which has appeared in your valuable *Journal* in respect thereto. The Great Wheel for United Mines were viewed some years since as the richest mines for tin in the world. There are three pumping-engines and three steam-whims now on Pooldown Mine, one pumping-engine, with suitable pitwork, and one steam-whim, would be sufficient. Experienced miners can form an idea as to the great amount of saving that would be effected if such an alteration as this were made. I hear that the tributors on the leaveings, at 15s. in 17, have been making up to last Christmas a profit at the rate of 10000l. per year. The adventurers could have worked the leaveings more extensively than they have been with the same agents. The leaveings on these mines are so extensive that it would take a quarter of a century to exhaust them, and no one can ascertain the value thereof by thousands of pounds.

The inhabitants of this parish are aware that the ground near the flat-rod shaft was locked up, in a great measure, for years. If this had not been the case the adventurers would have had the two rich deposits of tin to which reference is made to work on without any more water charges, and up to this time 40,0000l. worth of tin more might have been raised, and the mine got as rich as ever it was. The new discovery of tin at Edwards's (not far from the great cross-course) is certainly a very valuable one. Would it not have been for the interest of the adventurers to have offered the materials and mine for sale as a going concern? If a change had been made in the management they might not have had any reason for doing that.

*Breage, May 4.*

AN INHABITANT.

#### CORNISH MINING.

SIR.—The reaction in the tin trade has caused quite a revival in this industry, and already a great rise has taken place in the value of different mines. Unfortunately, there has been a dearth of foreign capital for the last year or two in our Cornish mines, and speculation ran so high amongst the (Cornish) friends to mining that many concerns were started having every promise of becoming profitable provided the necessary funds could be found for their thorough development, which were obliged to yield to the late calamitous depression.

I am glad to know that there is a better feeling existing with "out-of-the-county" capitalists towards this enterprise, and I have no doubt that the result of better prices for mineral which we are now getting will be the resuscitation of several; *apropos* to which there are some important improvements reported in several of the leading mines of the county; perhaps the most important is that of West Seton, which caused the price of shares to advance 200 per cent. in 24 hours. This mine, some months since, was oscillating between stopping and working; the latter determination will, probably, be the means of saving that part of the Camborne district, and reward the deserving shareholders for their pluck. This is another instance where unwearied exertion, together with the necessary capital to stem the tide of depression, has been sweetened by a just reward.

At West Gorland, in Gwennap, sinking has commenced in the bottom of Messer's shaft, where the old workers left off after having one of the richest courses of tin in the county. This is one of the best pieces of unexplored mining ground in this district, and it is not at all unlikely that a similar reward awaits the shareholders in this as in West Seton Mine. That the time has arrived for the capitalist to make a judicious selection of mining property to enrich himself is evidenced by the fact of the enhanced value of mineral, and the prospect of still greater prices being paid for both tin and copper, consequent on which higher prices must follow for all descriptions of mining stock. The writer within the last fortnight has visited some mines of established value, which must have an immediate turn upwards, the prospects of the mines fully warranting it.

*St. Day, Scorrier, Cornwall, May 7.*

CHARLES BAWDEN.

#### MINING IN TAVISTOCK.

SIR.—In November of last year I wrote a letter calling attention to the prospects of mining in this district. In the course of my remarks I intimated that the improvements which had recently taken place in some of the mines would probably in 1874 place them in a profitable and dividend condition. Subsequent facts have confirmed my assertion. The mines I cited were Clitters, Bedford United, Wheal Russell, and Furze Hill. I will now briefly advert to each in the order they stand, and I presume my statements will show that, notwithstanding the damaging rumours of panic-mongers, and despite an almost unprecedented depression in mining industry, and depreciation of mineral stocks, there still exists a vitality and productiveness in our mineral deposits which should encourage us to foster all efforts which are directed towards legitimate adventure. At the last meeting of Clitters, a few weeks ago, the accounts showed a credit balance of 7000l. after discharging all outstanding liabilities. Since the meeting it has been commonly reported that discoveries varying in value from 35l. to 1000l. per fathom have been made, and although no official declaration to this effect has appeared, I have reason to believe the report is correct. Taking into consideration the sound financial condition of this company, the rich quality of the ore, and the productive character of the lode, I think I am justified in asserting that a dividend will be declared at the next account. The last call at Bedford United seems to have produced a false impression upon the minds of speculators, and to have diverted their attention from the actual state of the property. I assume the call was made (although I have no direct authority for the assumption) to provide against the contingency of a deficit occurring through the non-maturity of ore bills. I assume this to be the case, because in the development of the north part of the mine no lode of equal value has been discovered to that which has been recently wrought upon in the midway level at the 115. The returns from this lode have for some time past met the monthly cost, and at the last sale of ore a profit of 1500l. was realised. I cannot in the short space of this letter fully revert to the other parts of the mine, which are indicative of future prosperity, but must content myself by simply alluding to the promising but undeveloped western ground, and the unequivocal nature of the indications which are associated with the operations upon the south lode.

At Wheal Russell a dividend of 9d. per 12,000th share has been declared since I wrote, and from information I have received I learn that the lode maintains its productive character. A few days ago it was stated that the value was increased. Be that as it may, the easy cost, the inexpensive mode of working will ensure a continuance of profitable results. Perhaps to no mine in the district is there attached such an interesting history as Furze Hill; it possesses the evidence of three distinct phases of mining operations. You can trace the work of that dim and obscure personage the pre-historic miner, and you can disentomb from its dark recesses the rude implements of a transitional period; the archaeologist can find there rude and imperfect vestiges of a forgotten generation, and, if he were industrious and inquisitive, he could cull many a curious tradition respecting the wealth of mineral which exists in its unproved and untrodden workings. It has been worked, suspended, and re-worked many times in its eventful existence, and from some cause or other there still lingers around it a charm and fascination which is irrepresible. But I suppose the present shareholders set little value upon these antiquarian objects of interest; the main object of their search is tin—its money; and now, according to the latest report, their desire will be gratified. It

is a pleasing task, after the difficulties of an undertaking are surmounted, to be able to reassure the patient but grumbling proprietary that such is the reward of their efforts. I believe the directors and agent have had to cope with obstacles of no ordinary character; they have had to pursue their explorations amidst unknown and treacherous excavations, which has necessitated extra precaution and entailed extra expenses; but the consciousness of possessing a good property has stimulated them to persistent action, and now, at the end of the struggle, they are able to present a report which is satisfactory in the highest sense of that term. I shall not attempt to supplement the agent's report of last week by any remarks of my own, more than to say I am confident it is truthful and trustworthy. I am fully persuaded that it was not written without deliberation and a due regard to the actual value of the lode. Capt. Doidge never commits a statement to paper which is incompatible with the most rigorous examination. I have just been told that 5 tons 7 cwt. of tin has sold at 56l. per ton, realising 2990l. 12s.—one month's produce. This will leave a profit of at least 1000l. Improvements have taken place in Prince of Wales and West Maria and Fortescue within the last few days; but, as I have no definite information of the real character of the improvements, I shall forbear calling the attention of your readers to them.

*Tavistock, May 7.*

MINER.

#### REMARKS ON THE "ORIGINAL CORRESPONDENCE" IN THE SUPPLEMENT TO THE "MINING JOURNAL."

SIR.—"Gold Fields of Nova Scotia:" Your correspondent, "Acadiensis," need not have brushed up his rusty old Latin to have told us that he was no cobbler. We never said he was; nor anything about his mending old shoes. As to his German proverb, we recommend another for his consideration equally as trite, "Der Zorn richtet nur Böses aus." We cannot help having excited "Acadiensis's" anger, neither is it due to us that he has a bad case; so had indeed as to induce him to refrain from controversy and to indulge in epithets. Anyone need go no further than the statistics brought forward by "Acadiensis" to see the result from Nova Scotia Gold Mining; and these figures having been brought forward to show the prospects on extended workings to judge such prospects. Your correspondent nowhere states what the cost has been; but what, in his opinion, the cost of production should be. In this he estimates labour and current expenses, leaving the cost of plant out of the question. Probably, if English companies would supply the stamping and all other machinery, and fix it, and then give up the mines, probably some spots might be selected that would come up for a short time with "Acadiensis's" estimate, provided that he did not work so very extensively as to require imported labour. We would be sorry to discourage any legitimate mining enterprise, notwithstanding "Acadiensis's" unparalleled offensiveness. That, however, while amusing him, not having hurt us, has not influenced our remarks, yet may have induced us to look more closely into his figures, which certainly do not show Nova Scotia gold mining in a very attractive light. We should like to have more "argument" from him.

"On Tin Stamps:" We think it very fortunate for Mr. Ennor that he has had no opportunity of putting up his extraordinary stamps in such a mine as he has noticed, as to it would certainly be attributed all the blame of getting into the Stamp Court. But why does not Mr. Ennor select a "shod" mine and erect his stamps thereon? That would be the most decisive way of proving both his own superiority and the effectiveness of his stamps.

"Great Wheel Vor:" We believe there is much truth in the letter from "A Lover of Justice," and if large shareholders would enquire in the neighbourhood they would find that they are throwing away a good mine.

"Metaliferous Mining in the Highlands:" If your correspondent, Mr. James Campbell, knowing the localities, would search them up diligently, he would be in a fair way of conferring a great public benefit on his country, as we doubt not there being much mineral riches here lying quiescent from lack of explorers.

"Acadell Mining Companies:" We recommend the letter signed "S. N." to the attention of capitalists about to embark in such undertakings. The fact of this being a country abundantly endowed with mineral wealth does not appear to have prevented worthless schemes being foisted on the public, and we fear the future is not likely to be more free from these abuses than the past.

READERS OF THE "MINING JOURNAL."

#### COURT GRANGE MINE.

SIR.—I was very much pleased to see in the Supplement to the *Journal* of April 4 from your worthy Chairman, that the prospects of this mine are very cheering, and that the work at surface has been satisfactorily done. But I think for the benefit of all concerned that our committee should call in a practical and independent engineer to report on the work done, and also on the price of materials. There is no doubt of our having a good property if well managed; but mining is like many other pursuits, it requires practice to use economy and judgment to lay open a mine, and not one of theory. Having been staying at Aberystwith for some few days gives me an opportunity to ascertain some facts, and I hope that the committee will take a hint.

TOURIST.

#### RE THE SHELTON CLAY AND TIN MINING COMPANY.

SIR.—A letter appeared in the *Mining Journal* of April 25, signed F. Warwick, and dated from the chief office, 25, Bucklersbury, London, &c. This letter appears to be a reply to one of a previous date from Mr. William Garty, Dublin, which had reference to the management of this company. As a shareholder of the Shelton Clay Company, I am sorry that I cannot endorse Mr. Warwick's statements; on the contrary, if called on, I would be obliged to aver—1. That I never heard, nor did I receive, any intimation of the holding of the three general meetings which he alleges to have been held; and—2. That since January, 1873, I have received no balance-sheet, or other document, showing how the accounts of the company stood. Mr. Garty, therefore, is not the only shareholder who has been kept in ignorance of what has been done with this property, or in connection with it, for the past 15 months. What, then, becomes of Mr. Warwick's statement where he writes, "The real facts are that every shareholder has from the time since I was appointed in January, 1873, been informed of the proceedings?" With Mr. Garty I make the second shareholder who has not been informed. How many more are there?

Mr. Warwick seems to imagine that the established reputation of the office from which he dates his letter ought to compensate the shareholders for all shortcomings. I am not prepared to take the "established reputation of this office" as a guarantee that my interest in the Shelton Company will be protected; I require more tangible proof than the mere standing of an establishment or individual to satisfy me of the fact. I have yet received no proof that my interests will be protected, and, judging from what has transpired, I have not much hope that they will.

With Mr. Warwick's letter I am for the present done; but I beg the consideration of my shareholders to the following—It is upwards of 15 months since the Shelton Company passed into the hands of the liquidator; since then there has been ample time to either dispose of the property, re-construct the company, or of maturing plans for the future working of it, and if the liquidator has not been able to accomplish some one or other of these plans named I am bound to say that the shareholders ought without further delay take the steps necessary to place the property in the hands of some party or parties more competent to carry out their wishes. I would add that every day's delay tends to additional expense and charges, and that if action is to be taken at all in the matter no time ought to be lost in doing so.

A DUBLIN SHAREHOLDER.

[For remainder of Original Correspondence, see to-day's *Journal*.]

FURZE HILL.—After an opening career which has been marked by difficulties of no ordinary character, it is very gratifying to find that Furze Hill Mine, Horrabridge, is now presenting indications which go far to bear out the predictions which we formed of it when the attempt was first made to resuscitate it. It is only a vigorous and energetic company that could have kept the concern afloat for so long a time in face of the troubles that have had to be contended with; but, satisfied of the bona fide character of their adventure, they have stuck to it with a persistency which is beyond all praise, and there is now some hope that the shareholders will be rewarded for their patience and outlay. Capt. Doidge, in a report which he has just issued, says—"We shall send another parcel of tin to market on Monday next, computed at 5 tons, which will leave a profit on the four weeks' working of about 1000l. There is no doubt when the bottom of the ancient working is reached below the 54, which is under this elvan, that a good course of tin will be met with."

CORNISH MINE SHARE MARKET.—In the early part of the past week the Share Market was inactive and depressed, and prices slightly rooded. This was, no doubt, partly attributable to the uncertainty felt in reference to the tin market; some predicted we should have a drop, whilst others were of a contrary opinion—at any rate, there was, as usual, but little disposition to speculate at the easier prices. On Tuesday, however, tin looked much better in the London market, and it was stated that the demand from America was much more brisk; this immediately had a reviving effect on the share market, and prices rapidly advanced—Tincrofts from 26s. sellers, after the meeting, to 30s. 32½; Carn Brea from 42s. 53½; Dolcoaths from about 41 to 44½; and other tin stock in like proportion. A good demand sprang up, and the market still continues in a lively state. We have also been cheered to hear that an important discovery for copper has been made at West Seton. It is stated that this is one of the finest bunches of ore found for a long time past, and on the strength of it shares jumped from about 12, 14 to 30. We trust this is sufficient to place the district beyond danger now. It may almost be looked upon as a godsend, coming, as it does, at this opportune moment, when matters did certainly wear rather a gloomy aspect. It will, no doubt, be gladdening to the adventurers, and will, we hope, prove sufficiently important ultimately to place the mine in its old position on the dividend-paying list.

The following are the mines chiefly dealt in—Carn Brea shares, after the meeting on Monday, declined to 42s. sellers, but on the improved state of the tin market shares advanced to and close about 55, 55½; the report was considered a very good one, and they sold during the quarter 152 tons of tin. Cargolls steady, at 1½ to 2. Cook's Kitchen, 9½ to 10½. Dolcoaths were left rather quiet in the early part of the week, at 41, but are now firm and eagerly sought after at 44 to 46. East Pool continues firm, at 9½ to 10½. East Lovell still called 12 to 13. Rosewall Hill, 5s. to 10s. South Carn Brea has advanced to 2½, 3, since the sale of 1½ tons of tin within the past week (the quantity of three we k's' raising), which is considered very satisfactory. South Condurrow, 3½ to 3½; South Crofty rather quiet, at 9 to 10; South Roskear, 5 to 6; St. Ives Consols, 7 to 8. Tincroft shares, after the meeting, were offered at 26s. but have since improved, and close about 30 to 31. Trumpet Consols, 1 to 2. West Basset has gradually improved, and a steady business has been done at 10½ to 11. West Chiverton called 3 to 3½; West Frances shares have advanced from 11½, 12½ to 13½, 14½. West Seton shares have had a serious jump during the past week, in consequence of a discovery (which is likely to prove very valuable) in the 130 fm. level, west of Hilderley's shaft; the end has looked promising for some time past, and is now said to produce from 3 to 4 tons of copper ore per fathom; the improvement came just in time, as no doubt many of the shareholders who bought at a high figure have been rather dejected on looking at the recent low quotations; immediately after the discovery became known shares rapidly advanced from about 3 to 20, and then to 30, and it is stated that 50 even has been offered. What a time of lamenting for those who relinquished! West Tolgus, 37 to 38. Wheal Basset advanced from 15 to 25, 30. Wheal Kitty (St. Agnes) steady, at 7½ to 8½; Wheal Peewer, 3; Wheal Uny, 2 to 2½.—*West Briton.*

LONDON GENERAL OMNIBUS COMPANY.—Traffic receipts for the week ending May 3, 10,855l. 11s. 6d.



NERBUDDA COAL AND IRON COMPANY.

The CHAIRMAN then concluded by moving "That the report and statement of accounts presented to this meeting be received and adopted."

Mr. S. LLOYD FOSTER, in seconding the resolution, expressed the belief (and he spoke as a mining man—one who had had experience in mining all his life) that the company was now in a far more satisfactory state than it had been during the whole period of its existence. A great deal of trouble and time had been expended in the proposed scheme, but it was all worth the while, and he was all in favour of working it. He thought great credit was due to Mr. Maynard, the company's manager in India, who had developed the property, driven out galleries, &c., in a much more miner-like manner than any previous manager, and the result was that the directors were able to show a profit upon the operations of the year. (Hear, hear.) The arrangements made with the Great Indian Peninsular Company would end greatly to assist this company. And then the price that they got compared with the price the railway company would have to pay for English coal was so much less that it was to the interest of that company to take as much as they could from them. As they were not to be paid for the coal until they got into the way of working it, the company's coal they would not only succeed in carrying out the arrangement they had effected, subject to the sanction of the Government in India, but they would be enabled to renew the contract for a much longer period on similar and more advantageous terms. He had not the smallest fear as to the future. This company would not, he thought, ever become an immensely paying concern, but they might look confidently forward to be soon in receipt of fair dividends.

"Your directors cannot but regret that, notwithstanding their constant and unremitting attention to your affairs, they have not succeeded in obtaining more than a property for the utilisation of your capital; at the same time, they prefer incurring unmerited censure on that account, rather than embarking in mines which did not hold out a prospect of fair and remunerative returns." "It would be for them to-day to say whether they thought the directors should have taken the trouble they had over this affair, and whether, if they took that trouble, the shareholders would support them in anything they did on their behalf. The directors had no personal interest to serve, and their only anxiety was to serve the interests of the company; and he would never bring before the shareholders a property in which he was personally interested, for it should never be said that he had an object to serve, but anything which he laid before the shareholders, or introduced to the company, would be certainly for the good of the shareholders at large, in which, of course, being a shareholder, he would himself participate. (Cheers.) He was pleased to tell them that since they had met, the arrangements with respect to the Canadian property had been concluded; the agreements had been returned from Canada, and the new company had been registered that very day. He was now

to do with the company. The duty of the directors was to take steps to get the interest on it immediately. They had to look after their own interests, considering what the company had lost he thought they should be very careful. MR. APPELGARTH rose to order. There was no proposition before the board to work the Mammoth Copperopolis property. A proposition had certainly been spoken of, but when the proposition was made it would be very closely considered before it was taken up. (Hear, hear.)

A SHAREHOLDER said it seemed to him that the candour of the Chairman had exposed the cause of the squabble. The Chairman gave his opinion of what he considered the best opportunity to invest money. The gentleman who lost just set out to recover the money. (Mr. Landau) told the directors at once to take steps to recover the money. The directors had taken these steps, and they had got a judgment against the company, but they could not get the money before the Mammoth Copperopolis could pay it. (Hear, hear.) They would have to wait until the company was in position to pay this money. It had arisen from the misfortune of the American Shareholders. (The share holders seemed to think they were all right.) He was sorry, and because this was the case the share holders seemed to think they were immediately fall upon the directors and to take steps to recover the money. He thought the terms used were wrong, and at all called for. (Hear, hear.) If the directors did some wrong he did not think they would do it again; but if the shareholders







roken.—*Alpine Chronicle*, April 11.



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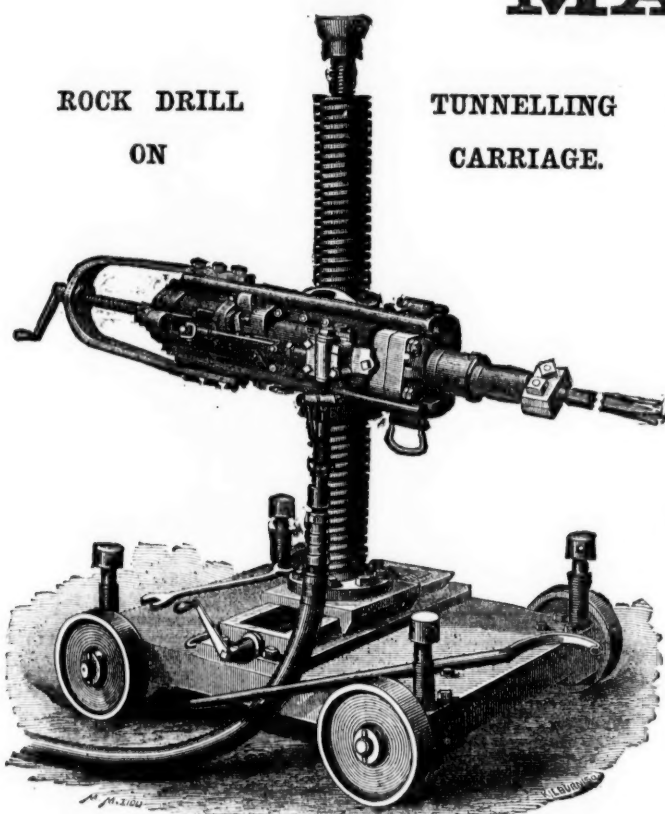
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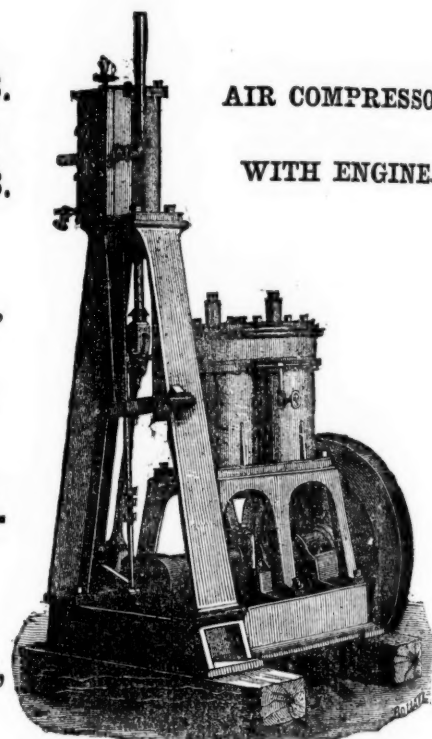
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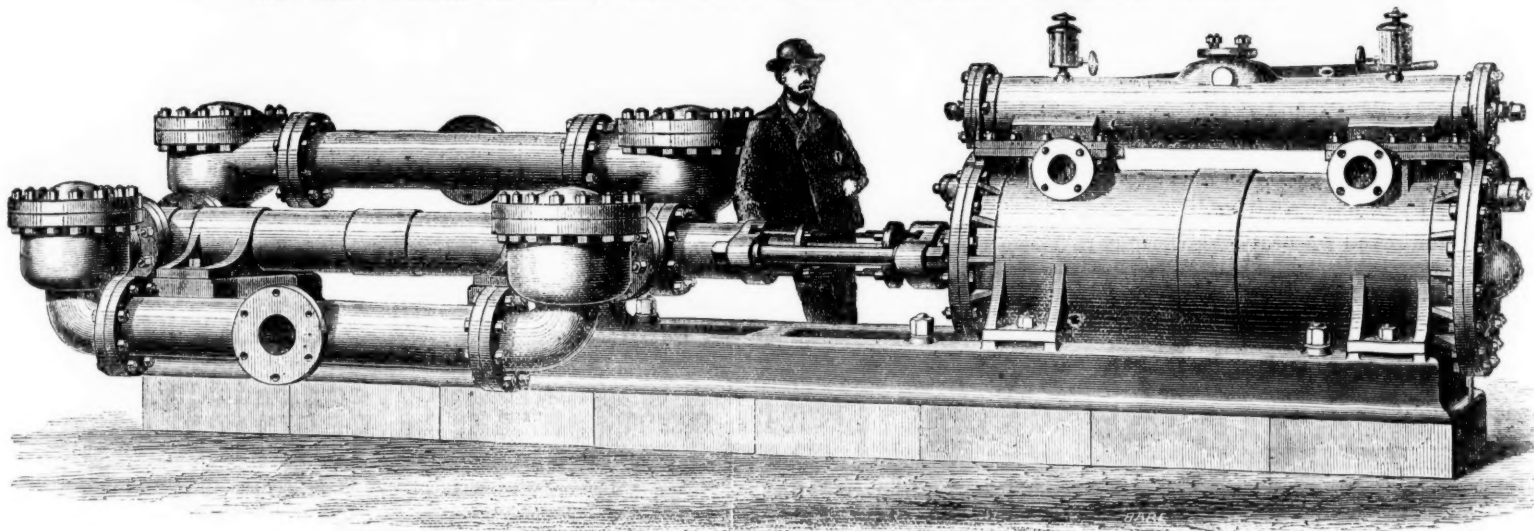
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Bolckow, Vaughan, and Co. ....	11	Dinnington .....	2	Llancarach .....	2	Oakenshaw .....	1	Strafford .....	2	West Thornley .....	1
Brancepeth .....	1	Donisthorpe .....	1	Llynvi .....	1	Old Thornley.....	1	Stanrigg .....	1	West Yorkshire .....	1
Brandon .....	1	Drumgray .....	1	Lochore .....	1	Pease's West .....	1	Sutton Heath .....	1	West Lanes .....	1
Briggs, H., Son and Co. ....	1	Dunfermline .....	1	Longhurst .....	1	Pegswood .....	1	Thornley .....	3	Whitefield .....	1
Brinkeburn .....	1	Duffryn .....	1	Lumley Thicks .....	1	Pelton .....	1	Tindale .....	2	Whitworth .....	6
Brownrigg .....	1	Eckington .....	1	Marley Hill .....	1	Pontyclere .....	2	Trimdon Grange .....	1	Widdrington .....	5
Brethby .....	2	Etherley .....	4	Milkwell Burn .....	2	Queensferry .....	2	Tudhoe .....	9	Worsbro' Dale .....	2
Butterknowle .....	3	Fell .....	3	New Brancepeth .....	3	Railey Fell .....	1	Tudhoe Grange .....	2	Worcester .....	4
Cambois .....	1	Findon Hill .....	3	New Copley .....	3	Seaton Delaval .....	2	Victoria .....	1	Workington .....	1
Cambusnethan .....	1	George .....	1	Newton .....	4	Shire Oaks .....	2	Vobster and Mells .....	2		

PARTICULARS OF THE "SPECIAL" STEAM PUMPING ENGINES SUITABLE FOR HIGH LIFTS IN MINES.

	6	7	8	10	12	7	8	10	12	14	16	8	10	12	14	16	18	21	10	12	14	16
Diameter of Steam Cylinder .....	6	7	8	10	12	7	8	10	12	14	16	8	10	12	14	16	18	21	10	12	14	16
Diameter of Water Cylinder .....	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5	5	6	6	6	6
Length of Stroke .....	24	24	24	26	26	24	24	24	26	26	26	24	24	26	26	26	26	26	24	24	26	26
Gallons per hour, approximate .....	2,200	2,200	2,200	2,200	2,200	3,900	3,900	3,900	3,900	3,900	3,900	6,100	6,100	6,100	6,100	6,100	6,100	6,100	8,800	8,800	8,800	8,800
Height in feet to which water can be raised with 30 lbs. pressure per square inch of steam, or compressed air, at pump .....	180	244	319	500	720	137	180	281	405	551	720	115	180	259	352	461	581	793	124	180	247	320
Ditto ditto at 40 lbs. .....	240	325	425	665	960	183	240	375	540	735	960	153	240	345	470	615	775	1,058	166	240	330	426
Ditto ditto at 50 lbs. .....	300	406	531	831	1,200	228	300	468	675	918	1,200	191	300	431	587	768	968	1,322	207	300	412	532

PARTICULARS, &c.—Continued.

	18	21	24	26	12	14	16	18	21	24	26	30	14	16	18	21	24	26	30	32	16	18
Diameter of Steam Cylinder .....	18	21	24	26	12	14	16	18	21	24	26	30	14	16	18	21	24	26	30	32	16	18
Diameter of Water Cylinder .....	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	9	9
Length of Stroke .....	36	48	48	72	24	24	36	36	48	48	48	72	24	24	36	48	48	48	48	72	24	36
Gallons per hour, approximate .....	8,800	8,800	8,800	8,800	11,900	11,900	11,900	11,900	11,900	11,900	11,900	11,900	15,600	15,600	15,600	15,600	15,600	15,600	15,600	15,600	19,800	19,800
Height in feet to which water can be raised with 30 lbs. pressure per square inch of steam, or compressed air, at pump .....	405	555	720	855	135	180	234	300	405	525	620	825	137	180	225	310	405	475	630	720	142	180
Ditto ditto at 40 lbs. .....	540	740	960	1,140	180	240	312	400	540	700	827	1,100	183	240	300	413	540	633	840	960	190	240
Ditto ditto at 50 lbs. .....	675	925	1,200	1,425	225	300	390	500	675	875	1,033	1,375	228	300	375	516	675	791	1,050	1,200	237	300

PARTICULARS, &c.—Continued.

	21	24	26	30	32	18	21	24	26	30	32	18	21	24	26	30	32	21	24	26	30	32
Diameter of Steam Cylinder .....	21	24	26	30	32	18	21	24	26	30	32	18	21	24	26	30	32	21	24	26	30	32
Diameter of Water Cylinder .....	9	9	9	9	9	10	10	10	10	10	10	12	12	12	12	12	12	14	14	14	14	14
Length of Stroke .....	36	48	48	48	72	36	36	48	48	48	72	36	36	36	48	48	72	36	36	48	48	72
Gallons per hour, approximate .....	19,800	19,800	19,800	19,800	19,800	24,400	24,400	24,400	24,400	24,400	24,400	35,240	35,240	35,240	35,240	35,240	35,240	47,960	47,960	47,960	47,960	47,960
Height in feet to which water can be raised with 30 lbs. pressure per square inch of steam, or compressed air, at pump .....	244	320	375	500	568	146	198	258	303	405	468	101	137	180	211	281	320	101	127	150	206	234
Ditto ditto at 40 lbs. .....	326	427	500	665	758	195	264	345	405	540	625	135	183	240	282	375	426	135	170	200	275	313
Ditto ditto at 50 lbs. .....	407	533	625	831	947	243	330	431	506	675	781	168	228	300	352	463	532	168	212	250	343	391

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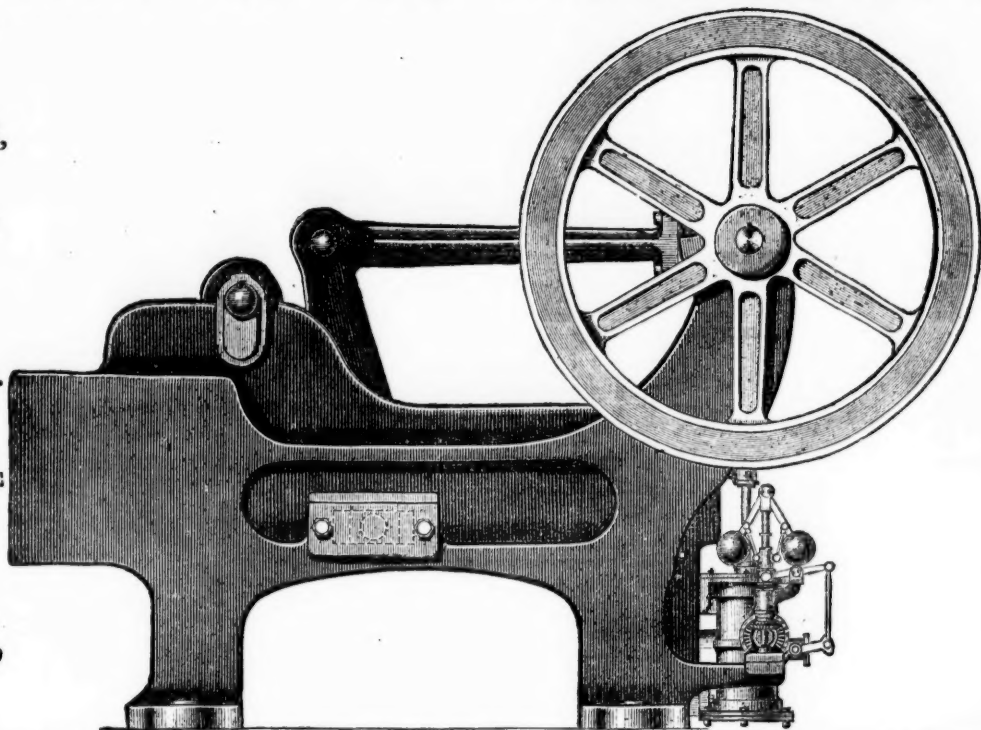
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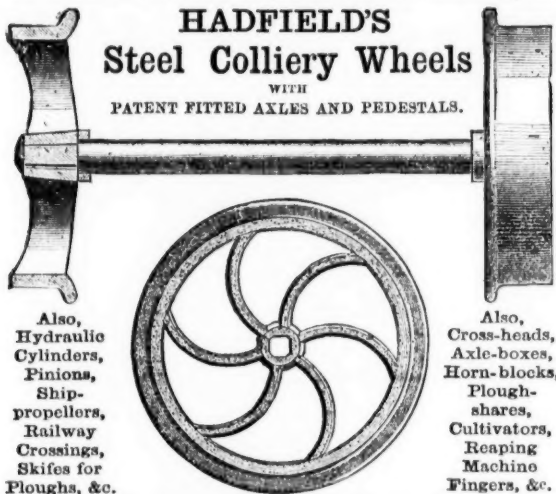
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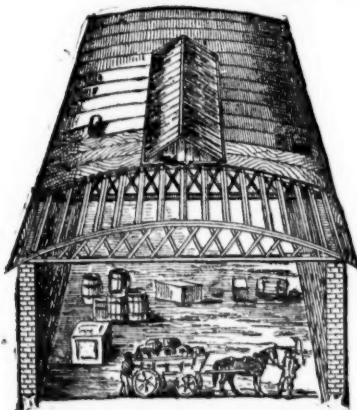
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